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Using cold atoms to sympathetically cool a levitated nanosphere[1]
EDUARDO ALEJANDRO, CRIS MONTOYA, WILLIAM EOM, Northwestern University, APRYL WITHERSPOON, University of Nevada, Reno, ANDREW GERACI, Northwestern University — In search of new physics, the mesoscopic regime can be probed by a single 85 nm silica nanosphere, cooled to the vibrational ground state by optically-coupled cold atoms. Rubidium atoms are loaded in a MOT and optical tweezers trap a single nanosphere in a separate chamber. The systems can then be coupled for sympathetic cooling through radiation pressure forces mediated by a 1-D optical lattice. Using laser cooling techniques, the atoms can sympathetically cool the center of mass motion of the trapped sphere. Such cooled spheres can be used for precision sensing, matter-wave interferometry, and tests of quantum coherence in the mesoscopic regime.

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